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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,226	07/18/2003	Bruce H.T. Chai	UCF-237DIV	2717
23717	7590	06/16/2004	EXAMINER	
LAW OFFICES OF BRIAN S STEINBERGER 101 BREVARD AVENUE COCOA, FL 32922			LEE, SHUN K	
			ART UNIT	PAPER NUMBER
			2878	

DATE MAILED: 06/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n No.	Applicant(s)	
	10/623,226	CHAI ET AL.	
	Examiner	Art Unit	
	Shun Lee	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspond nc address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 April 2004 and 19 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 7/18/03 & 4/5/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0404</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. It is noted that applicant has filed an information disclosure statement on 19 April 2004 under 37 CFR 1.97(e) with certification. However, it appears that the information disclosure statement filed 19 April 2004 consists of copies of previously submitted PTO-1449 and PTO-892 which were sent to applicant. Applicant should note that an information disclosure statement must comply with 37 CFR 1.52. Applicant should also note that the references cited in US Patent 6,624,420 have been listed on an enclosed PTO-892.

Drawings

2. The drawings were received on 5 April 2004. These drawings are acceptable.

Specification

3. The amendment filed 5 April 2004 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: "multi-phonon" (the paragraph at page 4, line 9 to page 5, line 1) has been changed to --multi-photon--.

Applicant is required to cancel the new matter in the reply to this Office Action.

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

(a) claims 30, 34, and 37 recite the limitation transparent;

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- (b) claim 32 recite the limitation wherein said scintillator has a luminescence wavelength of about 420 nm;
- (c) claim 33 recite the limitation wherein said scintillator has a luminescence decay time of about 35-45 ns; and
- (d) claims 36 and 39 recite the limitation wherein said photodetector comprises a charge-coupled device.

5. The disclosure is also objected to because of the following informalities:
“Divisional” in the first sentence of the first paragraph on pg. 1 should probably be --continuation-in-part-- (see the lack of proper antecedent basis for the claimed subject matter noted in the preceding paragraph and MPEP § 201.06(c)). Applicant should also note that 37 CFR 1.63(e) states that a newly executed oath or declaration must be filed in any continuation-in-part application, which application may name all, more, or fewer than all of the inventors named in the prior application. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim 21 is rejected under 35 U.S.C. 102(b) as being anticipated by Kurata *et al.* (US 5,690,731).

In regard to claim **21**, Kurata *et al.* disclose a composition for detection of energy radiation (column 1, lines 18-20) comprising a cerium doped lutetium yttrium orthosilicate mono crystal (*i.e.*, a Ce doped R_2SiO_5 single crystal where R is at least one rare-earth element selected from the group consisting of La, Ce, Pr, Nd, Pm, Sm, Eu, Tb, Dy, Ho, Er, Tm, Yb, Lu, Y, and Sc such as R is LuY; column 7, lines 13-38).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 22-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurata *et al.* (US 5,690,731) in view of Berkstresser *et al.* (US 5,164,041).

In regard to claims **22** and **23** which are dependent on claim 21, the composition of Kurata *et al.* lacks that the cerium doped lutetium yttrium orthosilicate,

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$\text{Ce}_{2x}(\text{Lu}_{1-y}\text{Y}_y)_{2(1-x)}\text{SiO}_5$ with x = approximately 0.00001 to approximately 0.05 and y = approximately 0.0001 to approximately 0.9999 (or x ranges from approximately 0.0001 to approximately 0.001 and y ranges from approximately 0.3 to approximately 0.8). Berkstresser *et al.* teach that a cerium doped lutetium yttrium orthosilicate crystal is $\text{Ce}_{2x}(\text{Lu}_{1-y}\text{Y}_y)_{2(1-x)}\text{SiO}_5$ (e.g., Ce is up to 15 at. % of the total amount of the Y and Lu components, and Lu is up to 0.3; column 2, lines 8-19 and 57-66; column 3, lines 37-45) in order to obtain a crystal having a desired composition and growth direction (column 1, lines 51-65; column 3, lines 25-27; column 4, lines 1-5). Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the composition (e.g., x = approximately 0.00001 to approximately 0.05 and y = approximately 0.0001 to approximately 0.9999) in the composition of Kurata *et al.*, in order to obtain a LYSO crystal having a desired composition and growth direction.

In regard to claims **24-27**, Kurata *et al.* disclose (column 3, lines 53-64) a method of making a scintillation crystal comprising the steps of:

- (a) mixing raw materials together to form a mixture;
- (b) heating the mixture;
- (c) interacting the heated mixture with a seed crystal; and
- (d) growing a LYSO crystal (*i.e.*, a Ce doped R_2SiO_5 single crystal where R is at least one rare-earth element selected from the group consisting of La, Ce, Pr, Nd, Pm, Sm, Eu, Tb, Dy, Ho, Er, Tm, Yb, Lu, Y, and Sc such as R is LuY; column 7, lines 13-38) from the interaction.

The method of Kurata *et al.* lacks that the raw materials are substantially pure Lu_2O_3 , substantially pure Y_2O_3 , CeO_2 , substantially pure SiO_2 and that the seed crystal is LSO. Berkstresser *et al.* disclose (column 1, lines 51-65) that the orthosilicate crystals are grown using the well known Czochralski technique from a melt having a desired composition using substantially pure oxide powders (column 3, lines 35-37). Berkstresser *et al.* also disclose (column 3, lines 25-27; column 4, lines 1-5) the use of a seed crystal of a desired composition and orientation in order to obtain a desired growth direction. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide LSO seed crystal having a desired orientation and a melt having a desired composition (e.g., substantially pure Lu_2O_3 , Y_2O_3 , SiO_3 , and SiO_2) in the method of Kurata *et al.*, in order to obtain a LYSO crystal having a desired composition and growth direction.

In regard to claim **28** which is dependent on claim 24, Kurata *et al.* also disclose (column 1, lines 22-26) that the heating step includes heating the mixture to a molten state (*i.e.*, melt of the raw material).

In regard to claim **29** which is dependent on claim 24, Kurata *et al.* also disclose (column 8, lines 1-15) that the growing step includes separating and cooling the seed crystal.

11. Claims 30, 31, and 34-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurata *et al.* (US 5,690,731) in view of Berkstresser *et al.* (US 5,164,041) and Fitzpatrick (US 5,500,147).

In regard to claims **30** and **31**, Kurata *et al.* also disclose (column 1, lines 18-20) that the composition is widely used a crystal scintillator. Kurata *et al.* in view of Berkstresser *et al.* is applied as in claims 22 and 23 above, since it is noted that $\text{Lu}_{(2-\zeta-\xi)}\text{Y}_\zeta\text{Ce}_\xi\text{SiO}_5$ is equivalently expressed as $\text{Ce}_{2x}(\text{Lu}_{1-y}\text{Y}_y)_{2(1-x)}\text{SiO}_5$ wherein $x = \xi/2$ and $y = \zeta/(2-\xi)$ with $0.001 \leq \xi \leq 0.02$ and $0.05 \leq \zeta \leq 1.95$ (or $0.2 \leq \zeta \leq 1.8$) equivalent to $0.0005 \leq x \leq 0.01$ and $0.025 \leq y \leq 0.985$ (or $0.1 \leq y \leq 0.909$), respectively. The scintillator of Kurata *et al.* lacks an explicit description that the scintillator crystal is transparent. However, scintillators are well known in the art. For example, Fitzpatrick teaches (column 1, line 62 to column 2, line 8) that a scintillator is desirably transparent in order to transmit scintillation photons. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a transparent crystal in the scintillator of Kurata *et al.*, in order to transmit scintillation photons.

In regard to claims **34** and **37**, Kurata *et al.* in view of Berkstresser *et al.* and Fitzpatrick is applied as in claims 30 and 31 above. Kurata *et al.* also disclose (column 1, lines 27-35) a scintillation detector comprising a photodetector (*i.e.*, photomultiplier) optically coupled (*i.e.*, fitted) to the crystal scintillator for detecting light from the crystal scintillator.

In regard to claim **35** (which is dependent on claim 34) and claim **38** (which is dependent on claim 37), Kurata *et al.* also disclose (column 1, lines 27-35) that said photodetector comprises a photomultiplier tube.

In regard to claim **36** (which is dependent on claim 34) and claim **39** (which is dependent on claim 37), the detector of Kurata *et al.* lacks that said photodetector

comprises a charge-coupled device. However, scintillator photodetectors such as photomultiplier tubes or charge-coupled devices used in scintillation detectors are well known in the art. For example, Fitzpatrick teaches (column 2, lines 63-65) that a photodetector (e.g., photomultiplier tube or charge-coupled device) is optically coupled to a crystal scintillator for detecting light from the crystal scintillator. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention that the photodetector in the detector of Kurata *et al.* is selected from the group of known scintillator photodetectors such as photomultiplier tubes or charge-coupled devices, in order to detect light from the optically coupled crystal scintillator.

12. Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurata *et al.* (US 5,690,731) in view of Berkstresser *et al.* (US 5,164,041) and Fitzpatrick (US 5,500,147) as applied to claim 31 above, and further in view of Melcher *et al.* (J. of Crystal Growth 128:1001-1005, 1993) and Loutts *et al.* (J. of Crystal Growth 174:331-336, 1997).

In regard to claims **32** and **33** which are dependent on claim 31, the scintillator of Kurata *et al.* lacks an explicit description of a luminescence wavelength of about 420 nm and a luminescence decay time of about 35-45 ns. Kurata *et al.* also disclose (column 2, lines 13-21) that the rare-earth oxyorthosilicate lattice has a monoclinic structure. Melcher *et al.* teach (first paragraph of introduction on pg. 1001) that the rare-earth oxyorthosilicate lattice has a monoclinic structure for small rare-earth ions (e.g., Lu, Y). Melcher *et al.* also teach (third paragraph of results on pg. 1003-1004) that luminescence emission in Ce activated material arises from the 5d-4f transitions in Ce³⁺

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where the 5d level is modified by the rare-earth oxyorthosilicate lattice crystal field. Melcher *et al.* further teach that the Ce activated rare-earth oxyorthosilicate (where the rare earth is either Lu or Y) has a ~420 nm luminescence wavelength (Fig. 3) and a ~35-45 ns luminescence decay time (Fig. 4). Loutts *et al.* teach (conclusions on pg. 336) that most physical properties (*e.g.*, luminescence emission) of combinations of Ce activated rare-earth oxyorthosilicates vary almost linearly with combination. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention that the scintillator of Kurata *et al.* has a ~420 nm luminescence wavelength and a ~35-45 ns luminescence decay time since luminescence arises from the 5d-4f transitions in Ce^{3+} as taught by Melcher *et al.* and combinations of small rare-earth ions (*i.e.*, Lu and Y) in a rare-earth oxyorthosilicate monoclinic lattice will have physical properties (*e.g.*, luminescence emission) almost linearly varying with combination as taught by Loutts *et al.*

Terminal Disclaimer

13. The terminal disclaimer filed on 5 April 2004 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 6,624,420 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Arguments

14. Applicant's arguments filed 5 April 2004 have been fully considered but they are not persuasive.

First, in regard to Applicant's argument that the current examiner should not take an entirely new approach or attempt to reorient the point of view of a previous examiner in mere hopes of finding something (with MPEP § 2363.02 cited). It should be noted that MPEP § 2363.02 is entitled "Rejection of Previously Allowed Claims". Thus unless applicant is asserting that the instant claims are identical to previously allowed claims, MPEP § 2363.02 is not applicable.

Applicant argues (third paragraph on pg. 13 of remarks filed 5 April 2004) that Kurata *et al.* does not disclose a composition for detection of energy radiation. Examiner respectfully disagrees. Kurata *et al.* state (column 1, lines 7-15) "The present invention relates to a method of growing a single crystal of a rare-earth silicate ... used in, for example, X-ray detectors as scintillators and other electronic equipments".

Applicant argues (last paragraph on pg. 14 and last paragraph on pg. 16 of remarks filed 5 April 2004) of new and unexpected results (*i.e.*, improved scintillation properties) over Kurata *et al.* and Berkstresser *et al.* or any combination thereof. This argument is unpersuasive since applicant fails to provide evidence of unexpected results (*i.e.*, improved scintillation properties) over the cited prior art.

Applicant argues (last three paragraphs on pg. 15 of remarks filed 5 April 2004) that the incorporation of the claims from interference No. 105,083 is not new matter and the specification of the parent application has basis for these claimed features. Examiner respectfully disagrees. It should be noted that the winning party of the interference is not denied anything he or she was in possession of prior to the interference, nor does he or she acquire any additional rights as a result of the

interference (see MPEP § 2363.02). Therefore, the instant application should be redesignated as a continuation-in-part since the prior application lack proper antecedent basis (see specification objections noted above) for some of the claimed subject matter in the instant application.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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